## REMARKS

Various typographical errors in the specification have been corrected.

A modification to page 212 which exemplifies subject matter previously described has been added for clarification purposes, as readily contemplated by a person with ordinary skill in the art.

Claims 5, 6, 10, 11, 12, 16, 19, 20, 23, and 24 have been amended to secure correspondence between the specification and the claims.

A new claim 25 has been added.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

Page 175, line 9 has been amended as follows: --from the tag, by a simple dedicated $1 \times 1$ switching circuitry which is appended to every--.

Page 177, line 13 has been amended as follows: --10 ('0-bound') $\prec$ 00 ('idle'~~0~~) $\prec$ 11 ('1-bound').--.

Page 179, line 18 has been amended as follows: --of a bit-permuting network. The ~~guide of~~ routing tag for the particular $2^n \times 2^n$ networks studied in the prior--.

Page 180, line 1 has been amended as follows: --art is the destination address $d_1 d_2 \ldots d_n$ of a packet plus possibly an activity bit up front. By--.

Page 195, line 13 has been amended as follows: --possible number of 1-bound signals to the 1-output group. For a 2b-to-b concentrator ~~is~~--.

Page 195, line 17 has been amended as follows: --concentrator ~~is~~ composed of interconnected routing cells meets this criterion perfectly for--.

Page 196, line 4 has been amended as follows: --banyan-type network. The 2b-to-b concentrator ~~is~~ composed of interconnected routing--.

Page 196, lines 15-16 have been amended as follows: --concentrator ~~is~~ composed of interconnected routing cells can be substituted by a 2b-to-b concentrator ~~is~~ composed of interconnected 0-1 sorting cells. The same applies throughout --.

Page 197, line 10 has been amended as follows: --a 2b-to-b concentrator ~~is~~ composed of interconnected routing cells. The hybrid network--.

Page 197, line 13 has been amended as follows: --of routing cells, and the in-band control signals of a packet changes only between--.

Page 198, line 5 has been amended as follows: --for $1 \leq j \leq n$,~~,~~ ~~and~~ the in-band control signal to a concentrator in the $j^{th}$ super-stage is $1d_{\gamma(j)}$.--.

Page 200, line 8 has been amended as follows: --A concentrator ~~is~~ composed of interconnected routing cells is a--.

Page 206, line 13 has been amended as follows: --100101, 100111, 101101, and 101111, so this is a ~~2~~ 3-dimentional rectangle. The number of--.

Page 210, line 2 has been amended as follows: --$p_1 \ldots p_r$ serves as the tiebreaker when the two packets arrived at the same cell are both 0-bound or both 1-bound.--.

Page 212, line 18 has been amended as follows: --super-stage. Note that if $\gamma(p) = \gamma(q)$ in the guide of the network, where $p<q$, the q-th symbol of the routing tag $Q_{\gamma(q)}$ will repeat the p-th symbol $Q_{\gamma(p)}$, when $Q_{\gamma(p)} = Q_{\gamma(q)}$ = 'bicast', the packet may be bicasted at stage-p and then be bicasted again at stage-q such that undesired extra copies of the packet will be produced. Therefore, whenever $\gamma(p) = \gamma(q)$ in the guide of the network, the bicasting function of the whole stage of switching nodes at either stage-p or stage-q should be disabled to prevent such situation. The remaining parts of the control conincide with the above.--.

<u>In the Claims:</u>

--5. The method as recited in claim 3 wherein the routing includes removing the quaternary symbol $Q_j$-$Q_{\gamma(j)}$ from the routing tag of each of the packets or rotating the leading quaternary symbol $Q_j$-$Q_{\gamma(j)}$ of the routing tag of each of the packets to the end of the routing tag, before the said each of the packets exits from the j-th stage

cell, $1 \leq j \leq k$, such that the leading quaternary symbol of the routing tag of the said each of the packets in the j-th stage cell, $1 \leq j \leq k$, is always-$Q_j$ $Q_{\gamma(j)}$.

6. The method as recited in claim 5 wherein the routing includes using the leading quaternary symbol $Q_j$-$Q_{\gamma(j)}$ of the routing tag of each of the packets in the j-th stage cell, $1 \leq j \leq k$, to select an output or both outputs from the j-th stage cell to emit the said each of the packets.

10. The method as recited in claim 9 wherein the routing includes removing the quaternary symbol $Q_j$-$Q_{\gamma(j)}$ from the routing tag of each of the packets or rotating the leading quaternary symbol $Q_j$-$Q_{\gamma(j)}$ of the routing tag of each of the packets to the end of the routing tag, and rotating the r-bit priority code $p_1 \ldots p_r$ to the position behind the next quaternary symbol originally following the priority code in the routing tag, before said each of the packets exits from the j-th stage cell, $1 \leq j \leq k$, such that the leading bits of the routing tag of said each of the packets in the j-th stage cell, $1 \leq j \leq k$, are always $Q_j Q_{\gamma(j)} p_1 \ldots p_r$.

11. The method as recited in claim 10 wherein the routing includes using the leading quaternary symbol $Q_j$-$Q_{\gamma(j)}$ of the routing tag of each of the packets in the j-th stage cell, $1 \leq j \leq k$, and using the ensuing priority code $p_1 \ldots p_r$ as the tiebreaker when the two packets received at the same sorting cell are both 0-bound or both 1-bound, to select an output or both outputs from the j-th stage cell to emit said each of the packets.

12. A method for self-routing a plurality of real data packets through a $2^n \times 2^n$ switch, the switch having (a) $2^n$ external input ports, (b) $2^n$ external output ports labeled with $2^n$ distinct binary output addresses in the form of $b_1 b_2 \ldots b_n$, (c) a plurality of switching cells interconnected into a k-stage bit-permuting network which is characterized by the guide $\gamma(1), \gamma(2), \ldots, \gamma(k)$ where $\gamma$ is a mapping from the set $\{1, 2, \ldots, k\}$ to the set $\{1, 2, \ldots, n\}$, wherein each one of the switching cells is a sorting cell associated with the partial order "'0-bound' $\prec$ 'idle' $\prec$ '1-bound' and '0-bound' $\prec$ 'bicast' $\prec$ '1-bound'", and (d) extra circuitry at the output end of each one of the switching cells, where the extra circuitry is composed of two parallel $1\times1$ switching elements, one at each one of the two output ports of the said each one of the switching cells, each one of the real data packets arriving at a distinct external input port determining an active input port and destined for a rectangular set of output addresses represented by a quaternary sequence $Q_1, Q_2, \ldots, Q_n$, where each $Q_j$ is a quaternary symbol in any one of the three values: '0-bound', '1-bound', and 'bicast', the method comprising

generating an idle packet, which has no pre-determined destination output addresses, as a stream of '0' bits at each one of the non-active external input ports,

generating a routing tag $Q_{\gamma(1)}Q_{\gamma(2)}\ldots Q_{\gamma(k)}$ for each one of the packets with reference to the guide of the bit-permuting network and the destination output addresses of the packet, wherein each ~~$Q_j$~~ $Q_{\gamma(j)}$ has one of the values of '0-bound', '1-bound', or 'bicast' for a real data packet, or has the value 'idle' for an idle packet,

routing each one of the packets through the network by using $Q_{\gamma(j)}$ in the routing tag of the packet in the j-th stage cell, $1 \leq j \leq k$, to select an output or both outputs from the j-th stage cell to emit the packet, and

processing the routing tag of each one of the packets by the extra circuitry at the output end of the j-th stage sorting cell before the said each one of the packets exiting from the said j-th stage cell by removing the leading quaternary symbol from the routing tag or rotating the leading quaternary symbol to the end of the routing tag such that the leading quaternary symbol of the routing tag of each one of the packets at each one of the j-th stage cells, $1 \leq j \leq k$, is always $\cancel{Q_j}$ $Q_{\gamma(j)}$.

16. The method as recited in claim 12 wherein the packets are classified into $2^r$ priority classes, $r \geq 1$, where each of the priority classes is coded in an r-bit string $p_1 \ldots p_r$, the generating of routing tag for the packet includes generating $Q_{\gamma(1)} p_1 \ldots p_r Q_{\gamma(2)} \ldots Q_{\gamma(k)}$ as the routing tag, and the processing of the routing tag includes removing the quaternary symbol $\cancel{Q_j}$-$Q_{\gamma(j)}$ from the routing tag of each of the packets or rotating the leading quaternary symbol $\cancel{Q_j}$-$Q_{\gamma(j)}$ of the routing tag of each of the packets to the end of the routing tag, and rotating the r-bit priority code $p_1 \ldots p_r$ to the position behind the next quaternary symbol originally following the priority code in the routing tag, before the said each of the packets exiting from the j-th stage cell, $1 \leq j \leq k$, such that the leading bits of the routing tag of the said each of the packets in the j-th stage cell, $1 \leq j \leq k$, are always $\cancel{Q_j} Q_{\gamma(j)} p_1 \ldots p_r$, and the routing includes using the leading quaternary symbol $\cancel{Q_j}$-$Q_{\gamma(j)}$ of the routing tag of each of the packets in the j-th stage cell, $1 \leq j \leq k$, and using the ensuing priority code $p_1 \ldots p_r$ as the tiebreaker when the two packets arrived at the same sorting cell are both 0-bound or both 1-bound, to select an output or both outputs from the j-th stage cell to emit the said each of the packets.

19. The system as recited in claim 17 wherein the routing control circuitry includes means for removing the quaternary symbol $Q_j$-$Q_{\gamma(j)}$ from the routing tag of each of the packets or rotating the leading quaternary symbol $Q_j$-$Q_{\gamma(j)}$ of the routing tag of each of the packets to the end of the routing tag, before the said each of the packets exits from the j-th stage cell, $1 \leq j \leq k$, such that the leading quaternary symbol of the routing tag of the said each of the packets in the j-th stage cell, $1 \leq j \leq k$, is always $\cancel{Q_j}$ $Q_{\gamma(j)}$.

20. The system as recited in claim 19 wherein the routing control circuitry includes means for processing the leading quaternary symbol $Q_j$-$Q_{\gamma(j)}$ of the routing tag of each of the packets in the j-th stage cell, $1 \leq j \leq k$, to select an output or both outputs from the j-th stage cell to emit the said each of the packets.

23. The system as recited in claim 22 wherein the routing control circuitry includes means for removing the quaternary symbol $Q_j$-$Q_{\gamma(j)}$ from the routing tag of each of the packets or rotating the leading quaternary symbol $Q_j$-$Q_{\gamma(j)}$ of the routing tag of each of the packets to the end of the routing tag, and rotating the r-bit priority code $p_1 \ldots p_r$ to the position behind the next quaternary symbol originally following the priority code in the routing tag, before the said each of the packets exits from the j-th stage cell, $1 \leq j \leq k$, such that the leading bits of the routing tag of the said each of the packets in the j-th stage cell, $1 \leq j \leq k$, are always $Q_j Q_{\gamma(j)} p_1 \ldots p_r$.

24. The system as recited in claim 23 wherein the routing control circuitry includes means for processing the leading quaternary symbol $Q_j$-$Q_{\gamma(j)}$ of the routing tag of each of the packets in the j-th stage cell, $1 \leq j \leq k$, and means for processing the ensuing priority code $p_1 \ldots p_r$ as the tiebreaker when the two packets arrived at the same sorting cell are both 0-bound or both 1-bound, to select an output or both outputs from the j-th stage cell to emit the said each of the packets.--.